

## CLAIMS

1. Optical communication line (2) comprising:

- a first optical connection (S1) with accumulated chromatic dispersion at least partially compensated and

5 including:

- a first optical waveguide portion ( $F_{1-1}$ ) directly connectable to an output (OU1) of a first processing station (1) of electromagnetic radiation at a pre-established wavelength,

10 - a second optical waveguide portion ( $F_{2-1}$ ) coupled to the first portion,

- an amplifying station (A1) provided with a first input (IN1) directly connected to the second portion in order to receive the radiation and with a first output (OU2)

15 for amplified radiation,

- a second optical connection (S2) with at least partially compensated accumulated dispersion and including:

20 - a third optical waveguide portion ( $F_{2-2}$ ) directly connected to the first output (OU2),

- a fourth optical waveguide portion ( $F_{1-2}$ ) coupled to said third portion and directly connectable to a second input (IN2) of a second processing station (A2), said first ( $F_{1-1}$ ) and third ( $F_{2-2}$ ) portions  
25 being associated to respective first order chromatic

dispersions having opposite signs,  
characterized in that at least said first and third  
portions ( $F_{1-1}, F_{2-2}$ ) are associated to respective first  
order chromatic dispersions having, at the pre-  
5 established wavelength, a corresponding absolute value  
lower than or equal to  $13 \text{ ps}^2/\text{Km}$ .

2. Communication line (2) according to claim 1, wherein  
at least said first and third portions ( $F_{1-1}, F_{2-2}$ ) are  
associated to respective first order chromatic  
10 dispersions having, at the pre-established wavelength, a  
corresponding absolute value lower than  $10 \text{ ps}^2/\text{Km}$ .

3. Communication line (2) according to claim 1, wherein  
at least said first and third portions ( $F_{1-1}, F_{2-2}$ ) are  
associated to respective first order chromatic  
15 dispersions having, at the pre-established wavelength, an  
absolute value greater than  $0.5 \text{ ps}^2/\text{Km}$ .

4. Communication line (2) according to claim 3, wherein  
at least one of said first and third portions ( $F_{1-1}, F_{2-2}$ )  
is associated to respective first order chromatic  
20 dispersion having, at the pre-established wavelength, an  
absolute value greater than  $1 \text{ ps}^2/\text{Km}$ .

5. Communication line (2) according to claim 1, wherein  
the first and the second optical connections are  
substantially formed by waveguide portions having, at the  
25 pre-established wavelength, first order chromatic

dispersions in absolute value lower than  $13 \text{ ps}^2/\text{Km}$ .

6. Communication line (2) according to claim 1, where said waveguide portions are substantially formed by optical fibers.

5 7. Communication line (2) according to claim 1, wherein said first station (1) is such as to send on the first portion ( $F_{1-1}$ ) radiation having a first power value and said amplifying station (A1) is such as to send on the third portion ( $F_{2-2}$ ) amplified radiation having a second  
10 power value, the first and the third portions being such that the product of a non linearity coefficient associated to the first portion and said first power value is substantially equal to the product of a non linearity coefficient associated to the third portion and  
15 said second power value.

8. Communication line (2) according to claim 1, wherein the waveguides of said first portion ( $F_{1-1}$ ) and said third portion ( $F_{2-2}$ ) present effective areas of a value greater than or equal to  $40 \mu\text{m}^2$ .

20 9. Communication line (2) according to claim 8, wherein the waveguides of said first portion ( $F_{1-1}$ ) and said third portion ( $F_{2-2}$ ) present effective areas of a value greater than or equal to  $50 \mu\text{m}^2$ .

10. Communication line (2) according to claim 1, wherein  
25 said first (S1) and second (S2) optical connections

present a substantially zero accumulated dispersion.

11. Communication line (2) according to claim 1, wherein each of said first (S1) and second (S2) connections is composed of two directly coupled portions of optical  
5 fiber having chromatic dispersions of opposite signs.

12. Communication line (2) according to claim 1, wherein said first and second optical connections include single mode optical fibers.

13. Communication line (2) according to claim 1, wherein  
10 said first processing station is an information signal transmission station (1) including at least one source of radiation at a wavelength suitable for propagation in optical fiber.

14. Communication line (2) according to claim 1, wherein  
15 said second processing station (3) is an information signal receiving station.

15. Communication line (2) according to claim 13, wherein said transmission station (1) is such as to generate optical pulse signals.

20 16. Optical line (2) according to claim 1, wherein said first processing station (1) is a radiation amplifying station and said second processing station is a further radiation amplifying station.

17. Optical line (2) according to claim 1, wherein at  
25 least said first and said second optical connections have

a length greater than or equal to 40 km.

18. Optical line (2) according to claim 17, wherein said length is greater than or equal to 80 km.

19. Communication line (2) according to claim 1, wherein  
5 said first (S1) and second (S2) optical connections present substantially zero accumulated dispersion slope.

20. Method for manufacturing an optical line for a communication system, comprising the following steps:

- providing a first processing station (1) provided with  
10 an output for electromagnetic radiation having a pre-established wavelength,
- connecting a first input of an amplifying station (A1) to the first station (1) to receive radiation, the amplifying station being provided with a first output for  
15 amplified radiation,
- placing a first optical connection (S1) including at least a first portion of optical waveguide ( $F_{1-1}$ ) directly connected to said output and a second portion of optical waveguide ( $F_{2-1}$ ) directly connected to the first input,  
20 said first connection having at least partially compensated accumulated chromatic dispersion,
- placing a second optical connection (S2) having at least partially compensated accumulated chromatic dispersion and including a third portion of optical  
25 waveguide ( $F_{2-2}$ ) directly connected to the first output

and a fourth portion of optical waveguide ( $F_{1-2}$ ) directly connectable to a second processing station (A2),

- choosing said first ( $F_{1-1}$ ) and third portions ( $F_{2-2}$ ) in such a way that they are associated to respective first order chromatic dispersions of opposite signs and an absolute value, calculated at the pre-established wavelength, lower than or equal to  $13 \text{ ps}^2/\text{Km}$ .

21. Method for limiting the non linear effects in an optical communication system, comprising the following steps:

- supplying a first optical connection (S1) including at least a first portion of optical waveguide ( $F_{1-1}$ ) coupled to a second portion of optical waveguide ( $F_{2-1}$ ), said first connection having at least partially compensated accumulated chromatic dispersion,
- introducing electromagnetic radiation having a first wavelength in said first portion of optical waveguide ( $F_{1-1}$ ),
- amplifying the radiation leaving said second portion,
- propagating said amplified radiation in a second optical connection (S2) having at least partially compensated accumulated chromatic dispersion and including a third portion of optical waveguide ( $F_{2-2}$ ) coupled to a fourth portion of optical waveguide ( $F_{1-2}$ ),
- said first ( $F_{1-1}$ ) and third portions ( $F_{2-2}$ ) being

associated to respective first order chromatic dispersions of opposite signs and a respective absolute value, calculated at the pre-established wavelength, lower than or equal to  $13 \text{ ps}^2/\text{Km}$ .

5 22. Communication system (100) comprising:

- a first processing station (1) provided with an output (OU1) for electromagnetic radiation having a pre-established wavelength,
- an amplifying station (A1) provided with a first input (IN1) connected to the first station (1) to receive the  
10 radiation and with a first output (OU2) for amplified radiation,
- a first optical connection (S1) having at least partially compensated accumulated chromatic dispersion  
15 and including at least a first portion of optical waveguide ( $F_{1-1}$ ) directly connected to said output and a second portion of optical waveguide ( $F_{2-1}$ ) directly connected to the first input,
- a second optical connection (S2) having at least  
20 partially compensated accumulated chromatic dispersion and including at least a third portion of optical waveguide ( $F_{2-2}$ ) directly connected to the first output and a fourth portion of optical waveguide ( $F_{1-2}$ ) directly connectable to a second processing station (A2), said  
25 first ( $F_{1-1}$ ) and third portions ( $F_{2-2}$ ) being associated to

respective first order chromatic dispersions of opposite signs,  
characterized in that at least said first and third portions of fiber ( $F_{1-1}, F_{2-2}$ ) are associated to respective  
5 first order chromatic dispersions with an absolute value, at the pre-established wavelength, lower than or equal to 13 ps<sup>2</sup>/Km respectively.